Educational Pathways and Skills

Valorization Addendum

This addendum of valorization is in accordance with article 23.5 of the "Regulation governing the attainment of doctoral degrees at Maastricht University" decreed by resolution of the Board of Deans, dated 3 July 2013.

A good quality education is so important that UNESCO declared it a birthright.[74] One reason education is regarded as personally and societally beneficial is because it offers various pathways to develop a range of skills that will increase opportunities to succeed in the labor market. But media, think tanks, international organizations, policy makers and society are grappling with questions about how best to educate people for a changing workplace and whether discipline-specific, vocational or transversal skills are the most relevant.

Guidance for good practice is often sought by consulting what has (or has not) worked in the past. Macroeconomic literature highlights the absence of studies that distinguish between vocational and general education as a particularly policy relevant research gap. Without these types of studies, macroeconomic lessons cannot be gleaned from the past to help guide the future. Chapters 2 and 3 of this dissertation contribute to filling this gap and contribute to a deeper understanding of the economic relevance of vocational education in secondary school. Vocational education is definitionally specific to the workplace.

Policy makers can use the following results to concretely discuss the how vocational secondary schooling has affected economic growth over the past 60 years:

- First and foremost, vocational secondary schooling is consistently positively related to economic performance using a variety of metrics and analytical approaches. Therefore, vocational education should not be left out of the policy discussion. Despite re-entering the international public debate recently, the topic of vocational education was neglected in development for about 20 years and mistakenly left out of national innovation policy strategies in some advanced economies, such as Australia.

- Chapter 2 shows that at a global level, there has been a relative decline in vocational secondary schooling, but that there is a lot of variation between and within countries. National policy makers can use the data from Chapter 2 to assess the pattern in their own country and consider whether this has

[74] http://www.unesco.org/new/en/unesco-liaison-office-in-new-york/areas-of-action/education/right-to-education/

been a deliberate policy choice or the result of aggregate individual choices and whether this has coincided with national economic trends.

- The economic effect of vocational secondary schooling is captured better by GDP per capita than by GDP per worker. This suggests that the mechanism by which vocational secondary schooling affects GDP is primarily via increasing employment, smoothing the school to work transition, more than by increasing the efficiency or productivity of workers. Policy makers can use this information to design and sequence policy levers. For example, when unemployment levels are high, policy makers could consider directing more resources to vocational education pathways.

- Countries need to be closer to the technological frontier than previously theorized in order to take advantage of vocational secondary schooling for economic growth. This presents a policy puzzle that cannot be resolved with the research conducted in this thesis. It could be the quality of vocational secondary schooling is systematically higher in countries that are close to the technological frontier, or it could be that other external conditions associated with advanced stages of development need to be in place, before vocational secondary schooling to have a growth effect.

- Fortunately, the conclusions reached in Chapter 3 can be further vetted by other researchers, because the vocational secondary schooling data are made available in Chapter 2. A larger body of evidence will help policy makers distill whether differentials in the quality of vocational education drive its economic effect, or whether there are other factors at play. This information would aid decisions about when to invest in enhancing the quality of vocational programming.

The internationally comparable set of vocational secondary schooling data introduced and described in Chapter 2 are already available in the annex of a working paper (UNU-MERIT Working Paper Series #2016-002). These data will be made available via Dataverse in a user-friendly Stata file. The data have been used by Nobuya Haraguchi, Bruno Martorano, Marco Sanfilippo, Anirudh Shingal in 2018 to draft a paper on manufacturing growth accelerations in developing countries.[75] Factors that contribute to manufacturing growth accelerations in developing countries are clearly of interest to international policy makers. If it is shown that vocational secondary schooling plays a role, it provides policy makers with an evidence based understanding of how job-specific

[75] Their paper was recently submitted for a journal publication and was used for a UNIDO report.

secondary education is related to economic performance, in the long-run and during growth spurts.

The results in Chapter 3 are interesting for statistical agencies they were well received at the 35th International Association for Research in Income and Wealth (IARIW) conference held in Denmark in August, 2018. The IARIW association hosts conferences that are attended by statistical agencies around the world (i.e., Statistics Denmark, Statistics Sweden, Groningen Growth and Development Center at the University of Groningen, Bureau of Economic Analysis and Labor Statistics in the U.S., Eurostat, IMF, the OECD, and the Office for National Statistics UK) as well as representatives from academia from Russia, India, China and Japan, to mention a few. A primary objective of the IARIW is to collect, discuss, and disseminate new information about the definition and measurement of income, wealth, and related statistical measures. The acceptance of the paper underlying Chapter 3 at the 35th IARIW conference is indicative of interest in statistical forms of educational measurement that distinguish between vocational and general education pathways.

Chapter 4 shifts gears and investigates how public investments in different phases of schooling (primary, secondary and tertiary) relate to transversal numeracy skills in adulthood. Governments tend to prioritize education among the different public services under their purview. It is, for example, the fourth largest government expenditure in the EU (Eurostat, 2018)[76]. Methodologies and analysis regarding the optimal spread of expenditure to facilitate skill acquisition are clearly a matter of public interest and societal relevance that extends beyond academia. Policy makers can draw upon the following:

- Greater investments in primary school are important not only for higher numeracy scores later in life, but also for facilitating higher levels of educational attainment.

- In order to realize the full benefit of investments in primary, later stage investments in tertiary are also important.

- A well-designed investment strategy should take into account how the investments in different stages (primary, secondary, and tertiary) relate to each other. It is possible to calculate indicative thresholds where complementary investments become substitutes. This means that optimal investment goals in each stage could set so that the investments are brought up to (but not unnecessarily above) a certain threshold.

[76] Accessed November 2018 from: ttps://ec.europa.eu/eurostat/statistics-explained/index.php/Government_expenditure_by_function_–_COFOG

The insights from the results in Chapter 4 are highly relevant for policy makers when considering investment options available to them in different education stages, because the results show the interdependence of the investments matters for numeracy skills.

Early results from Chapter 4 were published as an IZA discussion paper (IZA DP No. 10565) and were presented at the Worldwide Universities Network (WUN) Economics Workshop held at Maastricht University in April 2016. The presentation resulted in my being selected to join a small diverse team of five people from four different continents. The team was asked by workshop organizers to submit a proposal for a small grant to work on a related global challenge. The WUN grant was awarded and subsequently resulted in a socially relevant published working paper about the role of school quality in closing skills gaps for young people with different immigrant backgrounds. The paper includes an assessment of STEM (Science Technology Engineering and Math) labor market outcomes. Involvement with WUN is not strictly about the value of the results from Chapter 4, but serves to illustrate how the public presentation of results from Chapter 4 piqued the interest of a broader community and led to desirable outcomes.

The first part of chapter 5 is a contemporary analysis about the job-education and skill match. It compares results from higher vocational and academic education pathways. The key lesson for policy makers is that the type of vocational education system matters. For example, whether the education system is non-vocational, school-based vocational, or has an apprenticeship vocational system, the best results in terms of job-education match and numeracy skill use at work are for people with higher vocational education in an apprenticeship vocational system. These results can be related back to the results from chapter 3 and the need to deepen the evidence base regarding which qualities of vocational education are linked with the best outcomes.

The future of work is a topic currently capturing the attention of all sectors (public, private and academic). Many argue that educational reform is needed to meet the needs of a workplace that is being reshaped by technology and digitalization. And although many people would agree with the following Chinese proverb: *"Do not confine your children to your own learning, for they were born in another time.",* there is little guidance for policy makers when it comes to innovation in education. While higher professional education in particular may be attempting to adapt its educational services to meet the needs of a changing labor market, the obstacles they face are not entirely clear. Firms have been surveyed about innovation and the obstacles to innovation for years. In the context of innovation in higher education, the significance of obstacles or challenges that

impede adaption, to the extent that these adaptations are crucial labor market success, will be borne by students, employers, and society when they enter the labor market.

Value-added in Chapter 5 comes from the development of a prototype survey that borrows from accumulated knowledge from innovation surveys and draws from a variety of existing survey instruments. The survey is explicitly designed to ask higher professional institutions about the challenges and opportunities they face when they attempt to adapt to meet the needs of the future workplace. The results of the survey point to very easily adoptable policy recommendations. For example, the community colleges in New York State (SUNY) say that they need more disaggregated data. At a time when LinkedIn is helping international organizations like the World Bank and the IDB identify skill mismatches (demand and supply) in Africa and Latin America, surely the SUNY system could partner with LinkedIN to gain access to better data. Universities of Applied Sciences in the Netherlands worry about upgrading the digital skills of their teachers. Policy makers in the Netherlands could look for ways to support teachers in upskilling. The survey itself could be further developed by organizations such as the OECD that are currently engaged in working on topics spanning innovation and labor market relevance of higher education.